

AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended) A method of manufacturing a metallic current collector for use in an electrochemical or galvanic cell, comprising the steps of:

(i) perforating a solid, flat metal strip using a continuous process that results in deformation of the strip at least locally near the perforations, wherein said deformation expressed by the ratio of the strip thickness before and after deformation is less than 10%; and

(ii) immediately following step (i), annealing the perforated strip at a temperature below the melting point of said metal or metal-alloy to yield a recrystallized microstructure special grain boundary content of at least 50% in deformed portions of the strip[[.]] ;

with the proviso that said metal consists of lead or lead alloyed with an element selected from the group consisting of Ca, Sr, Ba, Al, Sn, Ag, Bi, and combinations thereof.

Claim 2 (Cancelled).

Claim 3 (Currently Amended) A The method according to claim 1, wherein said continuous process is a process of reciprocating expansion.

Claim 4 (Currently Amended) A The method according to claim 1, wherein said continuous process is a process of rotary expansion.

Claim 5 (Currently Amended) A The method according to claim 1, wherein said continuous process comprises punching perforations through said metal strip.

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Claims 6-9 (Cancelled).

Claim 10 (Currently Amended) A The method according to ~~claim 8,~~ wherein claim 1, wherein said step of annealing is carried out at a temperature between 100 and 300°C for a duration of between 10 seconds and 20 minutes.

Claim 11 (Cancelled).

Claim 12 (Currently Amended) A The method according to ~~claim 9 or~~ claim 10, wherein said metallic current collector is a lead-acid battery grid.

Claim 13 (Currently Amended) A The method according to claim 1, further comprising the step, following step (ii), of quenching said perforated strip.

Claim 14 (Currently Amended) A ~~The~~ method according to claim 1 6 or ~~claim 7,~~ further comprising the step, following step (ii), of cooling the perforated strip to a temperature below 80°C.

Claim 15 (Currently Amended) A The method according to claim 1, wherein a strip accumulator is used for feeding said solid, flat metal strip into a perforator in step (i) to eliminate or reduce stoppages in said continuous process.

Claim 16 (Currently Amended) A The method according to claim 1, wherein said solid, flat metal strip is heat-treated prior to carrying out step (i).

Claim 17 (Cancelled).

Claim 18 (Currently Amended) A method of manufacturing a metallic current collector for use in an electrochemical or galvanic cell, comprising the steps of:

(i) perforating a solid, flat metal strip using a continuous process that results in deformation of the strip by less than 10% when expressed by the ratio of the strip thickness before and after perforation; and

(ii) annealing the perforated strip at a temperature below the melting point of said metal or metal-alloy to yield a special grain boundary content of at least 50% in deformed portions of the strip;

with the proviso that said metal consists of lead or lead alloyed with an element selected from the group consisting of Ca, Sr, Ba, Al, Sn, Ag, Bi, and combinations thereof.

Claims 19 (Currently Amended) A method of manufacturing a lead or lead alloy current collector for use in an electrochemical or galvanic cell, comprising the steps of:

(i) perforating a solid, flat metal strip using a continuous process that results in deformation of the strip by less than 10% when expressed by the ratio of the strip thickness before and after perforation; and

(ii) annealing the perforated strip at a temperature between 100°C and 300°C to yield a special grain boundary content of at least 50% in deformed portions of the strip;

with the proviso that said metal consists of lead or lead alloyed with an element selected from the group consisting of Ca, Sr, Ba, Al, Sn, Ag, Bi, and combinations thereof.

20. (Currently Amended) In a process for producing a metallic current collector in the form of a grid or mesh for use in an electrochemical or galvanic cell which comprises the steps of:

- a) making a deformed strip by perforating a solid flat metal strip using a continuous process that results in deformation of the strip at least locally near the perforations whereby said strip is formed into a grid or mesh configuration having a deformed portion, said deformation, expressed by the ratio of the strip thickness before and after perforation, being less than 10%;
- b) pasting the deformed strip with an electrochemically active material;
- c) flash curing the paste; and then
- d) cutting said pasted deformed strip into individual current collectors;

wherein the improvement comprises:

an annealing step wherein the deformed strip is annealed prior to pasting by heating the metal of said deformed strip to cause the formation of a ~~recrystallized microstructure~~ a special grain boundary content of at least 50% in said deformed portion; said heat treatment being performed at a temperature below the melting point of said metal for up to 20 minutes with the proviso that said metal consists of lead or lead alloyed with an element selected from the group consisting of Ca, Sr, Ba, Al, Sn, Ag, Bi and combinations thereof.

Claim 21 (Cancelled).

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Claim 22 (Currently Amended) A The method according to claim 20, wherein said continuous process is a process of reciprocating expansion.

Claim 23 (Currently Amended) A The method according to claim 20, wherein said continuous process is a process of rotary expansion.

Claim 24 (Currently Amended) A The method according to claim 20, wherein said continuous process comprises punching perforations through said metal strip.

Claims 25-28 (Cancelled).

Claim 29 (Currently Amended) A The method according to ~~claim 27~~, wherein claim 20, wherein said step of annealing is carried out at a temperature between 100 and 300°C for a duration of between 10 seconds and 20 minutes.

Claim 30 (Cancelled).

Claim 31 (Currently Amended) A The method according to ~~claim 28 or~~ claim 29, wherein said metallic current collector is a lead-acid battery grid.

Claim 32 (Currently Amended) A The method according to claim 20, further comprising quenching said deformed strip after said annealing step.

Claim 33 (Currently Amended) A The method according to claim 20 ~~25 or claim 26~~, further comprising cooling the deformed strip to a temperature below 80°C after said annealing step.

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Claim 34 (Currently Amended) A The method according to claim 20, wherein a strip accumulator is used for feeding said solid, flat metal strip into a perforator in step a) to eliminate or reduce stoppages in said continuous process.

Claim 35 (Currently Amended) A The method according to claim 20, wherein said solid, flat metal strip is heat-treated prior to carrying out step a).